

Trend Study 15-5-04

Study site name: Bates Knob.

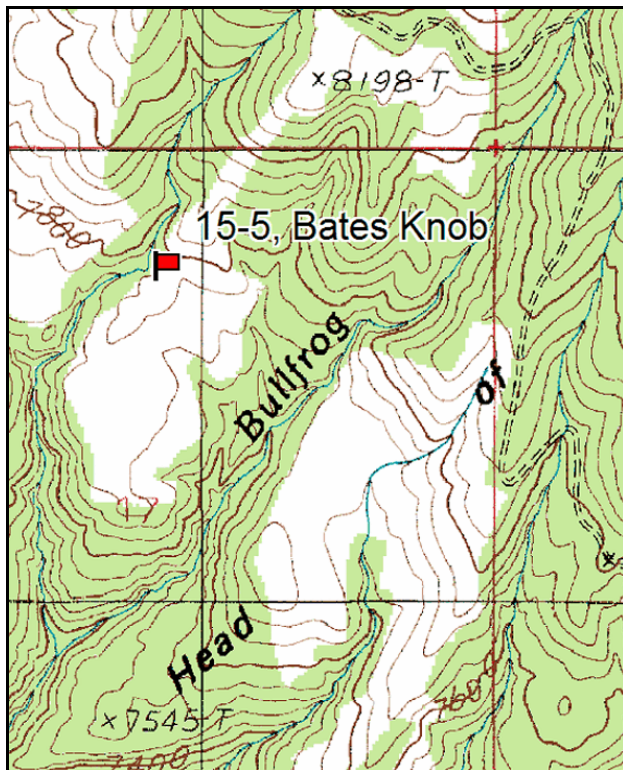
Vegetation type: Chained, Seeded P-J.

Compass bearing: frequency baseline 165 degrees magnetic.

Frequency belt placement: line 1 (11 & 95ft), line 2 (34ft), line 3 (59ft), line 4 (71ft).

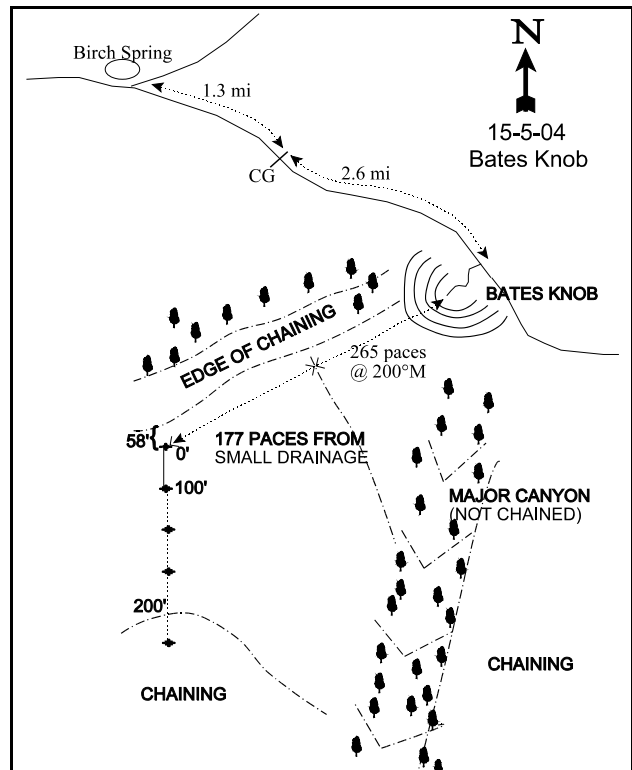
LOCATION DESCRIPTION

From Birch Spring (see transect 15-4-99), continue southwest on main road for 1.3 miles to a cattleguard. From the cattleguard, go 2.6 miles to a minor road which forks off to the right and goes up on top of a small hill (Bates Knob) overlooking a chaining. From the hilltop, walk down through a chained strip, over a small wash and through the chaining to the baseline stake, about 600 (265 paces) yards bearing 220°M. The transect is marked by 1 ½-foot tall fenceposts. The first baseline stake has a red browse tag, #7421, attached.



Map Name: Mount Ellen

Township 32S, Range 10E, Section 17



Diagrammatic Sketch

GPS: NAD 27, UTM 12S 4208706 N, 514898 E

DISCUSSION

Bates Knob - Trend Study No. 15-5

The Bates Knob study was set up to monitor range trend on a pinyon-juniper chaining located on the north end of the Pennell Allotment at an elevation of 7,700 feet. The site is on a slope that varies from 1-7% with an aspect that is generally to the southwest. Heavy rain fell on the site the week previous to sampling in 1999. Water is available seasonally in Buck Canyon, which is just south of the study site. The site is considered a key use area for bison. Seventy-five head of bison were observed near the site while data was being collected in July of 1987. Numerous bison were again observed directly on the site, as well as to the east when read in June of 1999. The study is one-fourth mile from the road and receives minimal use by people. Most of the chaining is not visible from the road, so anyone traveling on the road would probably not be aware of bison using the chaining. Pellet group quadrat frequency in 1994 and 1999 showed a high quadrat frequency for rabbit pellets, but was much lower in 2004. Pellet group data taken in 1999 estimated moderate to heavy use with 38 cow days use/acre (94 cdu/ha), 26 bison days use/acre (64 bdu/ha) and 3 deer days use/acre (7 ddu/ha). Pellet group data from 2004 indicated decreased use for cattle and bison with an estimated 6 cows days use/acre and 20 bison days use/acre (14 cdu/ha and 48 bdu/ha), but a slight increase for deer with 7 deer days use/acre (18 ddu/ha).

The soils at the site are a light colored, sandy clay loam of granitic origin. The pH is neutral at 7.1. The soil profile is rocky throughout, but not as much on the surface. The estimated effective rooting depth is about 15 inches. There is an organic layer present near the surface, but it is not common to the entire site. There is some noticeable trailing by animals through some areas. There was a acceptable amount of bare soil present in 1999 (19%), but in 2004 bare soil increased to 27% with the drought and significant losses to grass cover. The erosion index is still rated as stable. Evidence of any noticeable erosion is minimal at the present time. Downed trees left by the chaining are also piled in depressions to help limit erosion. Litter also protects plants from over utilization. Organic matter is built up in some places, due mostly to the chaining debris.

Preferred shrubs besides mountain big sagebrush are rare. Green rubber rabbitbrush, an increaser, density was estimated at 366 plants/acre in 1987. It increased dramatically by 1994 to 6,100 plants/acre. In 2004, the green rubber rabbitbrush population was mostly mature (72%) with an estimated density of 2,300 plants/acre. This was a 62% decrease since 1994. This subspecies has a large growth form and shows little or no use. In 2004, recruitment (percentage of young in population) was the lower than any previous reading at 19%. The number of seedlings through the years has been extremely variable, from as few as 80 to a high of 20,320 seedling/acre and was quite high in 2004 at 12,280 seedling/acre.

Mountain big sagebrush density has increased substantially since 1987. The population was estimated at only 66 plants/acre in 1987, increasing to 1,780 in 1994, and 4,740 plants/acre by 1999. However in 2004, the density was estimated at 3,320 plants/acre, a decrease of 30%. In 1999, 50% of the population were young plants, but due to dry conditions many of these plants probably died. The number of seedlings has varied greatly since 1987. In 2004, 3,160 seedlings/acre were counted. Recruitment has also been quite variable, from only 33 plants/acre in 1987 to a high of 2,260 plants/acre in 1999. In 2004, 360 young plants/acre were estimated. This kind of variability is common for shrubs, and not critical for a moderately long-lived shrub. Percent decadency has remained low over all years. The amount of moderate use on sagebrush had increased to 42% of population in 1999 and decreased to 31% in 2004. All plants showed only light use in 1994. The age class structure of sagebrush along with few decadent or dead plants and continuing good recruitment would indicate a continued increase of this species in the future with normal precipitation.

Pinyon and juniper trees were not particularly abundant in this area with an estimated 16 pinyon and 20 juniper trees/acre from point-quarter data in 1999. In 2004, point-quarter data showed an increase for both species with 34 pinyon and 32 juniper trees/acre with an average diameter of 4.2 inches for pinyon and 5.6

inches for juniper. It would be advisable to have a project to use chainsaws to thin or remove these trees before they start effecting understory production.

Crested wheatgrass and a rhizomatous alfalfa are the two key herbaceous species for this site. These species experienced heavy utilization prior to the sampling date of July of 1987. By 1994, both alfalfa and crested wheatgrass declined significantly in their sum of nested frequency values. In 1999, both species had similar abundance to the 1994 reading, with sum of nested frequency slightly increasing for both. Both species were heavily utilized by the time the site was read in June 1999. In 2004, both species had dropped in abundance (decreased sum of nested values) to the lowest values that had been recorded for this site. The drought has had an effect on most of the herbaceous species. Cheatgrass, an annual brome, increased significantly in sum of nested frequency value between 1994 and 1999, but was still relatively low in abundance. It had almost disappeared by 2004 due to drought. Cheatgrass could return with proper timing of precipitation and could increase to greater abundance, especially if other herbaceous species continue to decrease. Other forbs on the site are diverse, but most are infrequent. Total forb cover was only about 2% in 2004 and three-fourths of this was from alfalfa. Many annual species are present in the understory, but most are small and insignificant at this time.

1994 TREND ASSESSMENT

Soil conditions are similar to those of 1987. Due to the gentle topography, erosion is not a problem. Browse have increased dramatically (mostly due to the increaser green rubber rabbitbrush) on the site since the last reading. This increase however, could effect negatively the desirable herbaceous species, crested wheatgrass and alfalfa. Currently, the most numerous browse on the site is an unpalatable increaser green rubber rabbitbrush. Trend for browse on this chaining is considered down due to the increase of undesirable shrubs. The herbaceous understory also shows a downward trend. Sum of nested frequencies of perennial grasses and perennial forbs have declined.

TREND ASSESSMENT

soil - stable (3)

browse - down due to increase in unpalatable shrubs (1)

herbaceous understory - down (1)

winter range condition (DC index) - 60 (fair) Mountain big sagebrush/chaining type

1999 TREND ASSESSMENT

Trend for soils appears stable as ground cover characteristics are similar to 1994 conditions. Vegetation and litter remain at similar levels as does bare ground. Erosion is minimal even with high traffic from livestock and bison. Trend for the key browse, mountain big sagebrush, is up. Density has increased since 1994 with good recruitment. Very few decadent or dead plants exist with most plants classified with good vigor. The less palatable green rubber rabbitbrush has decreased slightly in numbers, but is still very similar to what it was previously. Overall, trend for browse is slightly up. The herbaceous understory shows a stable trend, although the species composition is limited to only crested wheatgrass and alfalfa, the key species. They have increased slightly in sum of nested frequency. The annual cheatgrass increased significantly, but still is at low enough levels that it is not a major concern.

TREND ASSESSMENT

soil - stable (3)

browse - up slightly (4)

herbaceous understory - stable (3)

winter range condition (DC index) - 65 (fair-good) Mountain big sagebrush/chaining type

2004 TREND ASSESSMENT

Trend for soil appears to be downward because of the major increase in bare soil. This was caused by decreases in litter cover and vegetation cover, mostly from the loss of herbaceous cover. Erosion is minimal even with the relatively high traffic from livestock and bison. Trend for the key browse, mountain big sagebrush, would be considered stable. Density has decreased slightly since 1999, however, the majority of this loss was from the young age class which almost made up 50% of the population. This was discussed in more detail in the introductory text for the Bates Knoll site. The losses to the young age class were more than compensated for by the increase in cover which increased by 54%. Very few decadent (4%) or dead plants (<1%) exist on site, with mostly >99% showing good vigor. The less palatable green rubber rabbitbrush has continued to decrease with a 61% decrease in density since 1999. The herbaceous understory shows a downward trend, with significant losses to crested wheatgrass and declines for alfalfa which even now makes up 91% of the herbaceous species cover. The annual cheatgrass component decreased significantly, and still at very low levels of abundance.

TREND ASSESSMENT

soil - down (1)

browse - stable (3)

herbaceous understory - down (1)

winter range condition (DC index) - 41 (poor) Mountain big sagebrush/chaining type, decreased index value mostly because of losses to the herbaceous understory

HERBACEOUS TRENDS --

Management unit 15 , Study no: 5

Type	Species	Nested Frequency				Average Cover %		
		'87	'94	'99	'04	'94	'99	'04
G	Agropyron cristatum	c300	b253	bc269	a153	10.38	11.92	4.75
G	Agropyron intermedium	3	-	-	-	-	-	-
G	Bouteloua gracilis	-	1	2	-	.00	.03	-
G	Bromus tectorum (a)	-	b41	c112	a7	.71	2.20	.02
G	Oryzopsis hymenoides	1	-	-	-	-	-	-
G	Sitanion hystrix	b24	a8	a5	a5	.04	.04	.01
G	Sporobolus cryptandrus	1	1	2	-	.00	.00	-
Total for Annual Grasses		0	41	112	7	0.71	2.20	0.01
Total for Perennial Grasses		329	263	278	158	10.44	12.00	4.76
Total for Grasses		329	304	390	165	11.15	14.20	4.78
F	Arabis spp.	-	3	4	-	.00	.01	-
F	Artemisia ludoviciana	b38	a2	a-	a-	.03	-	.03
F	Aster spp.	-	1	-	-	.00	-	-
F	Astragalus spp.	-	5	2	5	.04	.00	.03
F	Astragalus utahensis	-	4	1	6	.01	.00	.03
F	Chenopodium album (a)	-	10	-	-	.02	-	-
F	Chaenactis douglasii	3	1	3	-	.00	.01	-

Type	Species	Nested Frequency				Average Cover %		
		'87	'94	'99	'04	'94	'99	'04
F	<i>Chenopodium fremontii</i> (a)	-	a-	a-	b15	-	-	.09
F	<i>Cymopterus purpureus</i>	-	2	-	-	.00	-	-
F	<i>Descurainia pinnata</i> (a)	-	b47	a24	a3	.25	.07	.01
F	<i>Eriogonum alatum</i>	b26	a-	a-	a-	-	-	-
F	<i>Gayophytum ramosissimum</i> (a)	-	ab18	a1	b32	.03	.00	.09
F	<i>Hymenoxys acaulis</i>	9	-	-	2	-	-	.00
F	<i>Lappula occidentalis</i> (a)	-	b88	a15	a26	.77	.03	.13
F	<i>Lesquerella kingii</i>	b21	b26	b43	a-	.09	.30	-
F	<i>Machaeranthera canescens</i>	4	8	2	-	.01	.01	.00
F	<i>Medicago sativa</i>	b109	a30	a49	a23	2.13	1.48	1.62
F	<i>Penstemon</i> spp.	-	-	3	3	-	.00	.06
F	<i>Petradoria pumila</i>	-	-	6	-	-	.09	-
F	<i>Phlox longifolia</i>	-	2	5	6	.03	.01	.06
F	<i>Polygonum douglasii</i> (a)	-	b49	a1	a7	.25	.00	.02
F	<i>Senecio multilobatus</i>	-	3	-	2	.03	-	.03
F	<i>Sisymbrium altissimum</i> (a)	-	b21	ab7	a-	.24	.04	-
F	<i>Tragopogon dubius</i>	1	1	-	3	.00	-	.00
F	Unknown forb-perennial	9	-	-	-	-	-	-
Total for Annual Forbs		0	233	48	83	1.57	0.15	0.35
Total for Perennial Forbs		220	88	118	50	2.41	1.93	1.89
Total for Forbs		220	321	166	133	3.99	2.09	2.24

Values with different subscript letters are significantly different at alpha = 0.10

BROWSE TRENDS --

Management unit 15 , Study no: 5

Type	Species	Strip Frequency			Average Cover %		
		'94	'99	'04	'94	'99	'04
B	Artemesia carruthii	6	5	5	-	.06	.18
B	Artemisia tridentata vaseyana	20	34	29	1.77	3.59	5.52
B	Chrysothamnus nauseosus graveolens	73	78	56	5.67	7.78	7.45
B	Chrysothamnus viscidiflorus viscidiflorus	3	1	0	.17	-	-
B	Gutierrezia sarothrae	13	29	22	.00	.64	.66
B	Juniperus osteosperma	0	1	0	-	.38	.38
B	Pinus edulis	0	4	4	1.79	1.79	3.51
Total for Browse		115	152	116	9.42	14.25	17.72

CANOPY COVER, LINE INTERCEPT --

Management unit 15 , Study no: 5

Species	Percent Cover	
	'99	'04
Artemesia carruthii	-	.15
Artemisia tridentata vaseyana	-	7.66
Chrysothamnus nauseosus graveolens	-	9.21
Gutierrezia sarothrae	-	.20
Pinus edulis	1.00	3.58

KEY BROWSE ANNUAL LEADER GROWTH --

Management unit 15 , Study no: 5

Species	Average leader growth (in)
	'04
Artemisia tridentata vaseyana	2.7

POINT-QUARTER TREE DATA --

Management unit 15 , Study no: 5

Species	Trees per Acre	
	'99	'04
Juniperus osteosperma	20	32
Pinus edulis	16	34

Average diameter (in)	
'99	'04
5.3	5.6
3.8	4.2

BASIC COVER --

Management unit 15 , Study no: 5

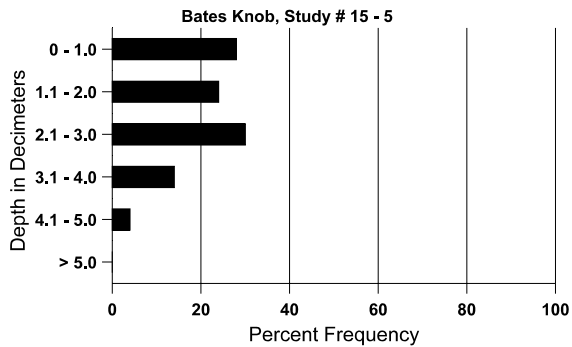
Cover Type	Average Cover %			
	'87	'94	'99	'04
Vegetation	6.00	25.36	28.06	23.93
Rock	5.25	5.65	7.41	7.75
Pavement	5.50	.68	1.61	2.55
Litter	57.50	39.38	47.73	31.77
Cryptogams	0	0	.21	.04
Bare Ground	25.75	18.68	19.11	27.37

SOIL ANALYSIS DATA --

Management unit 15, Study no: 5, Study Name: Bates Knob

Effective rooting depth (in)	Temp °F (depth)	pH	%sand	%silt	%clay	%OM	PPM P	PPM K	ds/m
15.0	56.7 (14.4)	7.1	46.0	25.4	28.6	2.8	16.9	121.6	0.7

Stoniness Index



PELLET GROUP DATA --

Management unit 15 , Study no: 5

Type	Quadrat Frequency		
	'94	'99	'04
Rabbit	14	20	2
Deer	3	8	3
Cattle	-	-	2
Buffalo	14	10	3

Days use per acre (ha)	
'99	'04
-	-
3 (7)	7 (18)
38 (94)	6 (14)
26 (64)	20 (48)

BROWSE CHARACTERISTICS --

Management unit 15 , Study no: 5

		Age class distribution (plants per acre)					Utilization					
Year	Plants per Acre (excluding seedlings)	Seedling	Young	Mature	Decadent	Dead	% moderate	% heavy	% decadent	% dying	% poor vigor	Average Height Crown (in)
Amelanchier utahensis												
87	0	-	-	-	-	-	0	0	-	-	0	-/-
94	0	-	-	-	-	-	0	0	-	-	0	-/-
99	0	-	-	-	-	-	0	0	-	-	0	-/-
04	0	-	-	-	-	-	0	0	-	-	0	47/23
Artemesia carruthii												
87	0	-	-	-	-	-	0	0	0	-	0	-/-
94	740	20	80	660	-	-	0	0	0	-	0	5/9
99	860	260	660	180	20	-	0	0	2	2	2	2/3
04	240	-	40	200	-	-	0	0	0	-	0	7/8
Artemisia tridentata vaseyana												
87	66	-	33	-	33	-	50	0	50	-	50	-/-
94	1780	4480	1180	600	-	-	0	0	0	-	0	14/20
99	4740	220	2260	2380	100	20	42	2	2	-	0	9/15
04	3320	3160	360	2820	140	40	31	6	4	.60	.60	18/29
Chrysothamnus nauseosus graveolens												
87	366	300	200	166	-	-	9	0	0	-	0	26/37
94	6100	20320	3200	2460	440	-	15	.32	7	4	7	22/28
99	5860	80	1240	4360	260	-	47	13	4	.68	.68	27/29
04	2300	12280	440	1660	200	160	0	0	9	3	3	27/34
Chrysothamnus viscidiflorus viscidiflorus												
87	0	-	-	-	-	-	0	0	-	-	0	-/-
94	80	440	-	80	-	-	0	0	-	-	0	5/6
99	20	-	-	20	-	-	0	0	-	-	0	6/10
04	0	-	-	-	-	-	0	0	-	-	0	-/-
Gutierrezia sarothrae												
87	200	-	-	200	-	-	0	0	0	-	0	8/5
94	400	20	180	220	-	-	10	0	0	-	0	20/31
99	1620	80	180	1380	60	40	0	0	4	2	2	7/9
04	860	60	40	740	80	20	0	0	9	9	9	9/10
Juniperus osteosperma												
87	33	-	33	-	-	-	0	0	-	-	0	-/-
94	0	-	-	-	-	-	0	0	-	-	0	-/-
99	20	-	20	-	-	20	0	0	-	-	0	-/-
04	0	-	-	-	-	-	0	0	-	-	0	-/-

		Age class distribution (plants per acre)					Utilization					
Year	Plants per Acre (excluding seedlings)	Seedling	Young	Mature	Decadent	Dead	% moderate	% heavy	% decadent	% dying	% poor vigor	Average Height Crown (in)
Opuntia spp.												
87	0	-	-	-	-	-	0	0	-	-	0	-/-
94	0	-	-	-	-	-	0	0	-	-	0	-/-
99	0	-	-	-	-	-	0	0	-	-	0	-/-
04	0	-	-	-	-	-	0	0	-	-	0	-/-
Pinus edulis												
87	33	-	33	-	-	-	0	0	-	-	0	-/-
94	0	-	-	-	-	-	0	0	-	-	0	-/-
99	80	-	-	80	-	20	0	0	-	-	0	-/-
04	140	-	40	100	-	-	0	0	-	-	0	-/-
Sambucus cerulea												
87	0	-	-	-	-	-	0	0	-	-	0	-/-
94	0	-	-	-	-	-	0	0	-	-	0	-/-
99	0	-	-	-	-	-	0	0	-	-	0	-/-
04	0	-	-	-	-	-	0	0	-	-	0	53/79